INTERIM REPORT ON INDUSTRIAL USES OF AGRICULTURAL PRODUCTS

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OF THE

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HOUSE OF REPRESENTATIVES

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INTERIM REPORT ON INDUSTRIAL USES OF AGRICULTURAL PRODUCTS

FRIDAY, MAY 10, 1957

HOUSE OF REPRESENTATIVES,
COMMITTEE ON AGRICULTURE,
SUBCOMMITTEE ON RESEARCH AND EXTENSION,
Washington, D. C.

The subcommittee met at 10 a. m., room 1310, House Office Building the Honorable Thomas G. Abernethy (chairman) presiding.

Mr. ABERNETHY. The subcommittee will be in order.

The subcommittee is meeting this morning for the purpose of briefly reviewing with the Department the Interim Report of the President's Commission to Increase Industrial Uses of Agricultural Products. This Commission was created as a result of a congressional directive which appeared in section 209 of Public Law 540 of the 84th Congress.

The particular section creating the Commission will be made a part of this record by reference.

On April 19 of this year the Commission filed an interim report which also will be made a part of the record by reference.

I understand that the report is being printed as a Senate document and will soon be available for distribution.

A few weeks ago this subcommittee conducted an informal executive hearing with the members of the Commission who provided the committee with some very interesting information. It will be the purpose of this committee to hear again, at an early date, from the Commissioners in an open session.

Inasmuch as the report of the Commission will probably lead to an expansion of the Agricultural Research Act, it is my feeling and the feeling of the members of this committee that we should have some comment thereon from the Department of Agriculture.

It is quite evident that they have not had the time to complete their study of the report and as I understand, they are not at this time in a position to make full and complete recommendations. I thoroughly understand that situation. I do not think it is humanly possible for any group of men, or any individual as brilliant as those we have here this morning, to come up with a final recommendation on this voluminous report. However, I thought it was appropriate, and so did the members of the committee, that we have the views of the Department this morning. I think we should conduct the meeting in a rather informal fashion and fully understand among ourselves that this is not the hearing which will necessarily result in legislative projection of the recommendations of the Commission. It is called simply for the purpose of getting things under way.

We have with us the Assistant Secretary of Agriculture, Mr. E. L. Peterson, and other officials of the Department.

Gentlemen, we are delighted to have you.

Mr. Secretary, if you will, please identify yourself and your associates for the record. You may then proceed with your statement.

STATEMENT OF HON. E. L. PETERSON, ASSISTANT SECRETARY, FEDERAL-STATES RELATIONS, UNITED STATES DEPARTMENT OF AGRICULTURE

Mr. PETERSON. Thank you very much, Mr. Chairman.

I am E. L. Peterson, Assistant Secretary and I have with me Dr. Shaw, the Administrator of the Agricultural Research Service, Dr. Irving, Deputy Administrator, and Mr. Lejko, assistant to the Administrator.

Mr. Chairman and gentlemen, we are glad to respond to your request to discuss with you the interim report made to the Congress by the Commission on Increased Industrial Use of Agricultural Products which was created pursuant to Public Law 540, 84th Congress. Because the report before the Congress is, as its title indicates, an interim report, we respectfully request the opportunity to amend or extend our comments subsequent to the presentation of the Commission's final report. The Department of Agriculture has given attention to the Commission's interim report but is not in position, at this time, to respond categorically to the several recommendations which the Commission makes.

Before going to the substance of the report, we wish to commend the Commission for the substantial exploration it has made of what is relatively a new field of agricultural research. The Commission's report is comprehensive. Its presentation is succinct. We feel the Commission has rendered a valuable public service. It has widely availed itself of broadly representative abilities and judgments in the formulation of the report it has made to the Congress. We commend the Commission for the contribution it has made to a broader understanding of the problems and the opportunities associated with the area of its explorations.

From its earliest beginnings the Department of Agriculture has fostered, supported, and conducted a practical program of research directed toward expanded uses for agricultural commodities. The scope of the Department's program in this area has been materially enlarged, particularly in recent years.

The Congress has recognized the desirability of this type of research by appropriating funds to support its conduct. The Department believes that utilization research offers better than reasonable hope of enlarging and extending markets for agricultural commodities. Accomplishments already made have been substantial.

We understand the Commission's objective as being that of extending and enlarging agricultural markets through findings of research and to find new crops, new uses and enlarged industrial utilization, particularly for surplus agricultural commodities. With this objective we are in full accord.

In 1956 I testified before a subcommittee of the Committee on Agriculture and Forestry of the United States Senate with respect to S. 3503, 84th Congress, as follows:

We must conclude, then, that to solve the surplus problem we must expand markets. We have three possibilities for doing this: (1) Stretch the export market as far as we can; (2) increase per capita consumption of higher quality foods; and (3) devise new uses for established crops and develop new crops with good market potentials as alternatives to those in surplus. We must use all three.

The Department's faith in research of the character outlined by the Commission in its report is based on the record of the regional research laboratories and their predecessor institutions which have demonstrated that research of this character can develop new and improved outlets for agricultural commodities.

Attached to this statement is a list of accomplishments offered as a sample of our progress. These accomplishments have been developed in a program of 15 years' duration—a program twice interrupted by redirection due to wartime needs.

Accomplishments of the emergency efforts are, we think, impressive. They include the commercial procedures for manufacture of penicillin and dextran, the conforming cotton bandage, extensive contributions to flameproofed textilds, dehydrated food technology and others. Industrial use for agricultural commodities is a field which we believe should have further extensive exploration.

Since the days when matters of agricultural concern were centered in the Patent Office, agricultural chemistry and utilization research have been among our prime scientific concerns. The Division of Chemistry was a very early segment of the newly created Department of Agriculture. Resources to expedite the improved utilization of agricultural commodities have twice been augmented materially by the Agricultural Adjustment Act of 1938, which established the four regional laboratories, and by the Research and Marketing Act of 1946. When the regional laboratories had been constructed their operating budget was about $4 million; this was increased over a period of years to about $6 million at the time the Research and Marketing Act was passed; passage of the Research and Marketing Act provided further stimulus and appropriations were increased to about $8 million where they stood at the time the present administration took office. This administration has recommended increased appropriations annually. These recommendations have regularly been accepted by the Congress. The 1958 budget is 75 percent greater than that of 1954.

The Department has long recognized the essential role of research for new crops, particularly those which might find outlets through industrial uses in a well-balanced program of agricultural research. With this background in utilization and new crops research, the Department believes it has the organization required to administer effectively such new or enlarged programs as may be authorized and provided for by the Congress. It is our belief that any enlarged program should utilize fully both the capacity of the Department, that of the land-grant colleges and other public and private organizations equipped and staffed to perform research of the kind here being discussed.

It is the view of the Department that the present administrative organization for the conduct of agricultural research is capable of absorbing and effectively applying a program of utilization research such as that which the Commission appears to envision. The success of a research program is closely related to the administrative organization which guides and directs it.

The Commission recommends—

the creation of a nonpartisan Board with 5 members, 4 to be appointed by the President by and with the advice and consent of the Senate, and 1 to be appointed by the Secretary of Agriculture, to be known as the Agricultural Research and Industrial Board.

In its discussion the Commission indicates that the recommendation provides for the establishment of an agricultural research and industrial board outside the Department of Agriculture and states that this Board should be clothed with the proper authority and responsibility for allocating funds to carry out the program recommended by the Commission.

The establishment of an independent board, as so recommended, would create many problems. The Department now has authority to conduct and is conducting the type of research discussed in the Commission's report. The Department has in the Agricultural Research Service an experienced, well organized research group prepared to undertake additional research responsibilities should the Congress so direct without the delays and complications that would inevitably attend setting up of a new agency.

The Agricultural Research Service over the past 15 years has developed relationships for effective collaboration with industries in defining problems, initiating research, carrying on programs, and, finally, translating results to industrial use. The Department has had experience with divided responsibility in research, and has found that such a condition retards rather than accelerates accomplishments. Very real problems are encountered when a program of similar or identical characteristics and having similar purposes is financed from two sources. Such a situation leads to exhaustive examination by appropriation committees and others, both within the executive and legislative branches, of the minutia of the program with disproportionate emphasis on details rather than purposes. Thus, the effectiveness of the entire program becomes restricted and limited.

Such difficulties were encountered in the initial stages following the enactment of the Research and Marketing Act of 1946, and were not fully overcome until the Congress resolved them by consolidating RMA funds with regular appropriations for research.

It is for these reasons that I believe whatever action may be taken to expand research, to increase the industrial use of agricultural products, find new uses, expanded uses, or to develop new crops, should provide for the administration and implementation of such effort by the Secretary of Agriculture, utilizing the research organization of the Department of Agriculture. This organization, and the facilities available to it, can be enlarged as necessary to accomplish the stated objectives. It has available through established programs, access to other public and private research organizations. It has an effective relationship with the several land-grant colleges and universities where similar and related type work is, and will continue to be, performed.

Mr. Chairman and gentlemen, I repeat that the Department strongly supports research as a means for advancing the welfare, marketing opportunities, and income of agricultural producers, as a means for bettering our level of living and as a means for expanding further our economic development. We agree with the Commission that research on new uses and new crops should be expanded. The Department will gladly join with the Congress in fully exploring the extent to which further efforts in this field may be undertaken.

Dr. Shaw, the Administrator of the Agricultural Research Service and coordinator of research for the Department, is present and will further discuss utilization research with you.

I shall be glad to respond to such questions as the committee may have. I thank you for the opportunity to express views on the Commission's interim report so far as they have, at this time, been developed.

Mr. ABERNETHY. Thank you, Mr. Secretary.

If it is agreeable with the committee, I think it would be appropriate if instead of questioning you now, Mr. Secretary, that we have Dr. Shaw's statement first.

Would that be agreeable with the committee?

All right, Dr. Shaw.

Before we proceed, Mr. Secretary, would you like to have inserted at the conclusion of your statement the document entitled "Developments Resulting from Utilization Research That Are Now in Commercial Use"?

Mr. PETERSON. Yes, Mr. Chairman.

(The data above mentioned is as follows:)

UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

Washington, D. C.

DEVELOPMENTS RESULTING FROM UTILIZATION RESEARCH THAT ARE NOW IN COMMERCIAL USE

Summary

Cereal and forage crops	29
Cotton and wool	16
Fruits and vegetables	40
Oilseeds	19
Sugar and special plants	20
Poultry, dairy and animal products	17
Grand total	141

CEREAL AND FORAGE CROPS

1. A new textile fiber from corn protein (zein).
2. Production of riboflavin by *Ashbya gossypii*.
3. Production of vitamin B_{12} by *Streptomyces olivaceus*.
4. Fungal amylase process of industrial alcohol.
5. Commercial production of penicillin.
6. Commercial production of clinical dextran, a blood plasma extender.
7. Fermentative production of sodium gluconate.
8. Starch sponge as a hemostatic agent.
9. Saccharic acid and its salts for sequestering agents.
10. Waxy cereal grains as sources of new industrial starches.
11. Batter process for production of starch and gluten from wheat flour.
12. Freezing procedures for bread and other baked products.
13. Waxy rice flour as a thickener for sauces and gravies in prepared frozen foods and canned foods
14. Improved drying techniques for rough rice.
15. Process for canning white rice.
16. Humidity control during rice milling to improve yields of head rice.
17. Aeration of stored rough rice to maintain high quality.
18. Preservation of vitamins and other nutrients in alfalfa meal with an antioxidant.
19. Addition of vegetable oils or animal fats to dehydrated alfalfa meal to control dusting.

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20. Improvement of steeping process in corn wet-milling.
21. Safe drying of corn for industrial utilization.
22. Production of 2-ketogluconic acid by fermentation.
23. Industrial yeasts improved by hybridization.
24. Important microorganisms made available to industry.
25. Gibberellin, a plant growth regulator.
26. Commercial production of itaconic acid.
27. Corrugating and structural boards from wheat straw.
28. Ground corncobs for soft-grit blast cleaning and other uses.
29. Mechano-chemical process, a new and revolutionary method for producing pulp from straw in high yield and with excellent strength characteristics.

COTTON AND WOOL

1. Cotton conforming bandage.
2. Heat- and rot-resistant cotton by partial acetylation.
3. Use of CMC (Carboxymethylcellulose) in laundered goods to improve resistance to soiling.
4. Tobacco shade cloth with longer life.
5. Permanent flame-resistant cotton cloth with THPC (Tetrakis-hydroxymethyl-phosphonium chloride).
6. Loom attachment for weaving dense cotton fabrics, air-permeable but water-impermeable.
7. New machine for more efficient opening and blending of cotton from the bales.
8. Differential dye test to evaluate maturity and dyeing characteristics of raw cottons.
9. Improved nep control through new techniques for carding cotton.
10. New guides for drafting cotton to improve the uniformity and strength of the resultant yarns.
11. Formulas for determining the correct distribution of zone drafts on three types of long draft roving systems.
12. New instrument for measuring fiber properties which aids the development of improved quality cottons with high elongation.
13. Printed cotton fabrics for fertilizer bags suitable for reuse in garments.
14. Stabilization of nitrocellulose in the manufacture of gum cotton from cotton linters.
15. Speedy method for conditioning wool prior to spinning and weaving.
16. Development of objective standards for grading the yellowness of wool.

FRUITS AND VEGETABLES

1. Process for recovering volatile flavor concentrate (essence) from apples and other fruits for use as a flavor. Engineering design for a fruit essence recovery unit.
2. Full flavor superconcentrated fruit juices from apples, grapes, strawberries, cherries, and other fruits.
3. Process for recovery of fruit essences from preserve manufacturing operations.
4. Citrus fruit juice powders, orange, grapefruit, and lemon.
5. Preparation of highly concentrated (sixfold to sevenfold) frozen citrus juice.
6. Development of color standards for orange juice.
7. Process for production of frozen purees of citrus and other fruits.
8. Flash pasteurization of citrus juice.
9. Frozen concentrated citrus juices.
10. Maturity test for oranges and grapefruit.
11. Method of developing color in citrus fruits by ethylene.
12. Deaeration equipment for use in canning single-strength juices.
13. Dehydrofreezing of apples.
14. Frozen concentrated strawberry and other berry juices.
15. Treatment of berry picking boxes with sodium orthophenyl phenate to control mold.
16. Method for removing thrips, etc., from cane berries.
17. Ripening procedure for freestone peaches for canning.
18. Ripening methods for juice apples.
19. Process for canning dates.
20. Pectin enzyme control in tomato product manufacture.
21. Tomato juice powder.
22. Dehydrofreezing of pimentos.

23. Objective indexes of quality deterioration in frozen fruits and vegetables during distribution.
24. Low temperature lye peeling for prepeeled potatoes.
25. Improvements in dehydrated diced potatoes and potato granules.
26. Starch-coated dehydrated diced carrots.
27. Control of "delay" off-flavor in frozen peas.
28. Improved procedure for blanching green beans for freezing.
29. In-package desiccation (for citrus and tomato powders, potato chips, hard candies, and dehydrated vegetables).
30. Froth flotation cleaning of vegetables for processing.
31. Single-pass evaporator with steam-injection heating for use in concentration and pasteurization of juices.
32. Fluidized bed drier for use in the production of potato granules.
33. Air-lift drier for use in the production of potato granules.
34. Belt-trough drier for use in dehydrofreezing or dehydration.
35. Design for a laboratory fermenter (the Humfeld fermenter).
36. Procedure for measuring frozen food temperature in unbroken cases without sacrifice of product.
37. Use of nuclear magnetic resonance for automatically controlling moisture content of processed agricultural products.
38. Pasteurization process for fresh-pack pickle products.
39. Reduction of losses in cucumber pickling by removing the replacing brine, thus reducing enzyme action which causes soft stock.
40. Process for preparation of chlorophyll, xanthophyll and carotene from leaf meals.

OILSEEDS

1. Polyamide resins from soybean oil for use in gelled paints, adhesives, and printing inks.
2. Soybean protein adhesives for shotgun shell casings and water-resistant boxboard.
3. Soybean oil of improved flavor stability.
4. Improved procedures in production of isolated soybean protein.
5. A process for removing the beany and bitter flavor of soybean products and for improving their color.
6. Nitrogen solubility index—an analytical procedure used to control the processing of soybean oil meal.
7. Taste panel procedures for evaluation of soybean oil and other edibile fats.
8. Dimer acid, a new industrial raw material from vegetable oils.
9. High shear agitation to improve the refining of crude cottonseed oils.
10. Improved preparation of cottonseed for direct solvent extraction.
11. New filtration-extraction process for oilseeds.
12. Nonclogging vapor-tight screw-conveyer for continuously feeding oil seed flakes to solvent extraction systems.
13. Improved recovery of solvent and improved color of oil from cottonseed solvent extraction plants.
14. High quality cottonseed meal for feeding to poultry and swine.
15. Chemically modified cottonseed oil (acetoglycerides) for use in cosmetics.
16. Methods for determining gossypol in cottonseed meats, meal, and oil.
17. Improved methods for determining moisture in peanut kernels.
18. Improved tung-oil vehicle formulations for use in paints.
19. Improved methods for handling and processing tung nuts.

SUGAR AND SPECIAL PLANTS

1. Improved techniques for processing sugarcane.
2. Reduction of losses in sugar content and purity by prompt grinding of sugarcane.
3. Recovery of aconitic acid from sugarcane molasses.
4. Improved yield of beet sugar through reduction of fermentation in extractors.
5. Basic studies leading to method for removing floc-forming materials during processing of sugar beets.
6. High-flavor maple sirup.
7. Dial thermometer for use in maple sirup manufacture.
8. Sanitary handling of maple sap.
9. Color standards for official grading of maple sirup and extracted honey.
10. Honey-fruit spread.
11. Production and pharmaceutical use of rutin and quercitrin.

12. Development of steam turpentine still.
13. Development and introduction of Olustee process of pine gum cleaning.
14. Covered separator and dehydrator for removing water from turpentine.
15. Improved removal of rosin acids from gum turpentine.
16. Steam cleaning of dip barrels.
17. Continuous still for the production of turpentine and rosin.
18. Process for production of myrcene.
19. A new chemical, maleopimaric acid, produced directly from pine gum and made available for use in plastics, photographic chemicals and printing inks.
20. The use of paramenthane hydroperoxide—produced from turpentine—as a catalyst in the manufacture of synthetic rubber.

POULTRY, DAIRY, AND ANIMAL PRODUCTS

1. Processing methods for producing satisfactory dried eggs.
2. Sterilization of shell eggs by high temperature treatment for a very short time.
3. Modifications of scalding and chilling procedures in the freezing and storage of poultry to reduce labor and avoid toughness of product.
4. Feather meal for fertilizer and feed uses.
5. Dairy waste disposal system which prevents stream pollution.
6. Improved heat exchanger for high-temperature pasteurization of milk.
7. Improvements in cheese manufacture.
8. Use of whey in caramels and in other candies and foods.
9. Use of butter in candies increased by using yeast to lengthen shelf life.
10. Use of soaps made from animal fats in manufacture of synthetic rubber.
11. Improved keeping quality of farm rendered lard.
12. Animal fats in industrial timplating.
13. Process for making high-quality technical oleic acid.
14. Vinyl stearate from fats for use in new-type plastics.
15. Epoxidized fats and oils for use in plastics.
16. Use of technical grade fats in animal and poultry feeds.
17. Synthetic detergents from fats.

Mr. ABERNETHY. Dr. Shaw?

STATEMENT OF MR. B. T. SHAW, ADMINISTRATOR, AGRICULTURAL RESEARCH SERVICE, UNITED STATES DEPARTMENT OF AGRICULTURE

Mr. SHAW. I am glad to have the opportunity to discuss with this committee the interim report to the Congress from the Commission on Increased Industrial Use of Agricultural Products. With the able collaboration of task forces made up of outstanding farmers, scientists, and industrialists, the Commission has provided in its report a fresh and broad look at an area of research of vital importance to American agriculture. The Commission has displayed keen discernment and breadth of vision in analyzing the manifold problems and recommendations which engaged its attention and in welding these into the comprehensive program it has proposed.

I should like to address my remarks primarily to the effects that the Commission's proposals would have upon research on utilization and new crops as it is presently conducted and the way in which administration and operation of the proposed program might be carried out if it is integrated in the Department of Agriculture with the beginnings we have already made in the areas covered by the Commission's report.

The Commission recommends that the amount now being spent on utilization research be tripled. On this basis, $50 million would be expended annually for this purpose. Such an expanded program would continue to provide for research on food and feed uses for agricul-

tural commodities but would be weighted toward research on industrial uses.

Research on the development of new and improved uses for agricultural commodities is now conducted in the four utilization research and development divisions of the Agricultural Research Service. Research on new and improved uses for forest products is now conducted in the Forest Service. Nearly 1,700 people are engaged in this work, approximately two-thirds of whom are professionally trained in the sciences. The funds budgeted for this purpose in fiscal year 1957 are approximately $14 million and $16 million are projected for fiscal year 1958. Approximately a half million dollars of these funds is used annually to support utilization research contracts with land-grant and other colleges, experiment stations, research foundations, and private industry. Another half million of these funds is devoted to research on utilization of new crops. In addition to other funds in fiscal year 1957, we are expending about $1 million for the introduction, agronomic and engineering phases of new crop development through other divisions of ARS.

The Department's utilization research constitutes the major effort in this field at this time. The utilization research program of the land-grant colleges is a modest one although some stations are expanding their programs and a few regional projects have been initiated in recent years. The land-grant colleges have been making a very large contribution to research in the areas of production and marketing. Because of their graduate training and other programs, and particularly because of their competence in basic research, they, as well as other universities, could also make a very great contribution in an expanded utilization research program.

A few industries contribute substantially to research on new uses for agricultural commodities but the overall effort by industry is small. Here again an expanded effort could make an important contribution.

In present physical facilities, the Department could increase its research programs in the areas of interest to the Commission by approximately $9 million above the fiscal year 1957 budget, about $2 million of which has been requested in the fiscal year 1958 budget. This visualizes an increase of about $6.5 million for new uses of farm and forest products and $2.5 million for research on new crops. While we are confident that further expansion of the program could be accomplished through contracts with universities and industry, we are convinced that if the program envisioned by the Commission is inaugurated, the expansion of Federal facilities should be given high priority.

An expanded program should visualize doubling the facilities of the four regional research laboratories and the Forest Products Laboratory. The cost would be about $30 million and construction would require about 2 years. Upon completion of the expansion of these facilities, approximately $35 million of the funds appropriated could be used to support research in Department laboratories. With this considerable core of Department research, a very substantial and effective research and development program in outside organizations could be managed by contracts and grants. We have had contracts with land-grant colleges and other institutions and we are confident that they can be counted upon to do effective utilization research on

a much broader scale. Experience has demonstrated that worthwhile contributions can be made under such circumstances if there is a strong, continuing "in house" research program to back it up.

To implement all of these programs, capable scientific manpower would be needed. The Commission's recommendation to provide a grant, scholarship, and fellowship program would aid materially in developing adequate numbers of scientists for the program and at the same time accomplish worthwhile research. The Department does not now have authority to provide such aids in the furtherance of its research program. While this new authority would be helpful in providing scientists in future years, authority to pay adequate salaries would still be needed to move the proposed program forward rapidly. If the new authorities were granted to increase sources of manpower, fellowships and other aids should be provided on a widely dispersed basis and not concentrated in a few universities. Satisfactory mechanisms for awarding grants, fellowships, and scholarships have been developed by the National Research Council.

I would like now to provide a description of how the program would work if it should be expanded and if the new authorities proposed by the Commission were provided. I will take a specific example. Let us consider a major breakthrough our scientists have recently achieved in starch chemistry. Through it, dialdehyde starch can be converted from a laboratory curiosity to a commercial and economic product of high promise. Our new process is readily controlled to give products of a whole range of properties, from those which retain much of the original starch characteristics and are useful for coatings, sizings, adhesives, and the like, to those which are new high polymers with properties differing from those of any other commercially available chemicals.

Limited studies of the utility of dialdehyde starch already have shown its potential usefulness in a number of applications. Early tests show it to act as a rapid and effective vegetable-type tanning agent for leather. It can be converted into a strong, tough plastic. Useful chemicals, such as polyalcohols, have been made from it in good yield.

Research is needed to develop and perfect large-scale production methods for this new product and for the development and evaluation of its industrial applications. Its chemical and physical properties are such that there is great probability of finding outlets in markets absorbing 240 million pounds of imported vegetable tannins, a billion pounds of polyalcohols, 800 million pounds of plastics, and other smaller volume uses. Additional opportunity exists for extended use of certain of the products as improved coatings and sizing agents in the paper and textile fields, which already consume 900 million pounds of cereal starch annually.

To develop this discovery with maximum effectiveness, a team of chemists, physicists, and other scientists would be organized to explore every facet of the preparation of dialdehyde starch, its physical properties, its chemical characteristics, and its conversion to other useful products. Through grants and contracts with colleges, universities, and other research institutions, our own resources would be augmented, taking advantage always of opportunities thus to enlist the aid of equipment or skills not available in our own laboratories. Contracts would be let with industry to produce experimental quantities

of products developed in the laboratory for further testing. Continuous formal and informal contacts with industrial representatives would seek to insure development of every possible application, using the contracting authority as needed but encouraging development without cost to the Government wherever it could be done. One of the most important phases, of course, would be that of determining costs at each step. A qualified member of our staff would be charged with full responsibility for pushing this one effort and being fully aware of every activity not only in our program but in each related one as well.

Mr. Chairman, I have tried to give you a picture of the way a major expansion in utilization research might be implemented. Through these means full advantage could be taken of the thoroughly systematized plan of research that can be achieved through our own laboratories; at the same time advantage could be taken through grants, fellowships, and contracts of the skills and facilities of colleges, universities, and other research institutions and laboratories as well as those of industry to develop and commercialize every new or improved product or process without loss of time. Based on our record we feel confident a substantial expansion of the utilization research effort will be richly rewarded.

Mr. ABERNETHY. Thank you, Dr. Shaw.

DEPARTMENT'S REVIEW OF COMMISSION'S REPORT

Mr. Secretary, would it be appropriate for us to ask you and the members of your staff to give us some analysis of the studies that you have made of this report up until now and any concrete views that you have thereon? I do not want you to put anything in the record that you have not absolutely nailed down. I realize that it is a very lengthy report and requires a tremendous amount of study; but if you are in position to analyze this rather detailed material and tell us what you have done about it up to now, we would like to have it; if not, it is perfectly understandable.

Mr. PETERSON. Mr. Chairman, we have not brought our analysis of the report to a point where we could give you anything but a most tentative evaluation of it. With your permission, we would prefer to defer responding to that question until the final report has been concluded and until we have brought our studies to a more perfected point.

Mr. ABERNETHY. The studies have been initiated?

Mr. PETERSON. We have been reviewing the report and are reviewing it now, both within the Secretary's Office and the Agricultural Research Service.

DEPARTMENT'S AUTHORITIES IN RELATION TO THE COMMISSION'S RECOMMENDATIONS

Mr. ABERNETHY. Is it fair to ask the question, for the record, whether or not you contemplate recommendations on the basis of what you have already gleaned from the report, or is it the feeling of the Department that it now has reasonably adequate authority to put into effect such recommendations as the Department feels would be wise and proper?

Mr. PETERSON. The Department now has authority to expand its research in this, as well as other fields. Some of the recommendations of the report could not be effectuated without additional authority from the Congress including the one Dr. Shaw has referred to, concerning fellowships and grants, the one within the body of the report covering the use of incentives, and the recommendation of the Commission with respect to administrative organization. As I said in my statement and as Dr. Shaw has indicated in his statement—we believe that with the existing administrative organization which we now have and which we agree is subject to strengthening by the appointment of an advisory board within the Department of a high-level, high-caliber group, we could carry out the general program which the Commission, as we understand its report here, envisions.

SUBMISSION OF DEPARTMENT'S VIEWS ON COMMISSION'S FINAL REPORT

Mr. ABERNETHY. Do you think that there is sufficient time between now and the adjournment of Congress—you know that is one of these things that no one ever knows when it will take place, but we do have some approximate idea—do you think it is possible that your studies will be far enough along so that you would have specific recommendations to make before adjournment?

Mr. PETERSON. I believe that could be accomplished, Mr. Chairman.

Mr. ABERNETHY. I do not want to leave the impression in the record that there is any dilatoriness on the part of anyone. I am satisfied, from my discussion of this matter with you, that the Department is proceeding as rapidly and as efficiently as possible.

Mr. PETERSON. Let me say first, that the Department on its own initiative and outside the Commission's area of exploration, has over the past years and still is constantly evaluating its total research program in relationship to research in and of itself and in relationship to the other responsibilities which the Department has. When the Commission was undertaking its studies we, of course, made our full staff available to the Commission to the extent that the Commission wished to draw upon the staff. They drew upon it rather considerably. So, we did have, and do have, from the technical level at least, a rather comprehensive understanding of what the Commission is attempting to get at. With respect to the use of incentives, and with respect to changes in administrative organization, we have not pursued our analysis sufficiently on a policy basis to have a recommendation that we would make to you at this time. I feel confident that it would be entirely feasible, working with the committee, to have the view of the Department as to those and other recommendations before the adjournment of Congress.

RECRUITMENT OF SCIENTIFIC PERSONNEL

Mr. ABERNETHY. Good research does not result just from the availability of physical facilities, laboratories, land and so forth. You have to have good men.

What is the Department's experience at this time in finding adequate scientists?

Mr. PETERSON. If I may, I would like to ask Dr. Shaw to respond to that question. He is in a better position to judge the competence of scientists than I am.

Mr. ABERNETHY. I wish he would and I would like to ask him to comment on the pay scales, whether that is having any effect on your securing competent scientists.

Mr. SHAW. We had a rather substantial increase in our funds for this current year, 1957, and we have had reasonable success in finding qualified and competent scientists to carry out the work. Our experience, along with that of others, employing scientists, has been that we have to do a much more intensive job of recruiting now than we did some years ago. Overall, I would say that we have offered about three jobs for each person we have employed. Our experience in that area is better than some of the other agencies of Government that are primarily hiring physicists and engineers. We hire a good many biologically trained people. There is no question about the fact that, overall in the country, there is a shortage of scientists. There are not enough to do what everyone wants to do. There is great competition and our salaries are not competitive with industry, particularly.

Mr. ABERNETHY. Have you lost any good men as a result?

Mr. SHAW. Yes. I do not have the figures with me on the numbers we have lost, but we have lost a goodly number over the past 2 or 3 years. We lost a very outstanding man the other day at the Forest Products Laboratory. We were paying him something of the order of $10,000 and he was hired for $20,000. We have had that experience repeatedly.

Mr. ABERNETHY. Did you lose him to that particular industry?

Mr. SHAW. Yes.

Mr. ABERNETHY. So that his services will still be available to that industry.

Mr. SHAW. His services will still be available to the forest industry. But I think the question so far as manpower is concerned in the considerations we have before us, whether or not we should expand this new-uses research, is primarily related to the priority we wish to attach to this work. I think we can say categorically that if we expanded this research in the magnitude that has been recommended by the Commission, people employed to do it would be taken from other research areas. There will be a few new graduates, but the bulk would have to be taken from other research somewhere. If we feel that the agricultural problem is of such serious proportions that it has a high enough priority to take these people from other areas, then we could hire them if we had salaries to attract them.

Mr. DIXON. Will the chairman yield for a question?

Mr. ABERNETHY. Yes, Dr. Dixon.

Mr. DIXON. If the program were administered by an outside agency, would there be the opportunity for recruiting more manpower through that outside agency than there would be if it were operated by the Department of Agriculture, with its close tieup with the land-grant colleges where they use student fellowships and scholarships?

Mr. SHAW. I cannot see any advantage that such an outside agency would have, and I can see disadvantages in that we have well established contacts with these land-grant colleges, and it would take a good while for an outside agency to establish such a relationship.

Mr. DIXON. I should not say land-grant colleges alone.

Mr. SHAW. This would be very largely in the field of chemistry, and of course every college and university has a good chemistry school, so the work could be done at land-grant colleges and other universities.

Mr. DIXON. With your close relationships with land-grant colleges and universities, you could do a better job of training the students that are already thereby showing them the great possibilities in this field than any outside agency could do in creating manpower?

Mr. SHAW. We think so, Dr. Dixon.

Mr. DIXON. The Manpower Commission here in Congress gave me a letter to the effect that they thought we should retrench in research because of the shortage of manpower, rather than expand like this President's Commission on Utilization Research is recommending we should do. I have a letter I would like to show you to see if this question of manpower presents an insurmountable barrier. What is your reaction to that?

Mr. SHAW. I feel agricultural problems are pretty serious. I think we need to solve them. If you are going to win a horserace, you have got to have a horse, and if you are going to win in science, you have to have scientists.

Mr. PETERSON. The distribution of total funds spent on research, public and private, between agricultural and nonagricultural is so disproportionate that it seems to me it is entirely proper to consider a balance in the use of the Nation's total scientific manpower on agricultural research as contrasted with nonagricultural research.

PUBLIC EXPENDITURES FOR AGRICULTURAL RESEARCH IN RELATION TO GROSS FARM INCOME

Mr. DIXON. As I understand, the expenditure on agricultural research is about 50 cents out of every $100 gross.

Mr. SHAW. That is about right for the total spent by USDA and the State experiment stations.

Mr. DIXON. What part of that 50 cents is spent on utilization research and how much on production research?

Mr. SHAW. On new uses research it would be something less than 5 cents out of the 50 cents. Another 5 cents would be spent on marketing research, and approximately another 1 cent would be spent on human nutrition research. So that would total about 11 cents out of the 50 cents, leaving about 39 cents for production research.

Mr. DIXON. That would be what percent?

Mr. SHAW. About 22 percent of the total is on new uses, markets, and home economics and nutrition.

DISTRIBUTION OF RESEARCH FUNDS

Mr. DIXON. Maybe I should not ask this question, but I feel I should. Do you think that is a proper balance in view of the fact production research helped to create surpluses. This is much to its credit because during the war we put the heat on farmers to produce more and more all the time. I am not speaking in any derogatory way, but through that pressure on production research we have these mountains of surpluses. Do you think there is a proper distribution of research funds between the two types of research?

Mr. SHAW. We feel the whole area of research should be expanded, but the efforts on new uses and markets perhaps should be expanded more than on production research. We do not feel it would be wise to curtail the efforts on production research, we have so many problems. Take the situation with almost any cereal crop. We have to develop a new variety for the farmers about every 5 or 6 years. The diseases develop in nature almost as fast as we can develop new varieties, and if we did not have new varieties the farmers would suffer.

We feel we probably will have many opportunities to adjust the current difficulties we have in agriculture through production research. For example, we feel if through research we could reduce the cost of producing livestock sufficiently so that the farmer could have a large enough margin for his efforts and be able to sell the livestock cheaper, that would go a long way toward solving the imbalance that now exists.

CLOSE COORDINATION OF PRODUCTION AND UTILIZATION RESEARCH

Mr. DIXON. You cannot separate the 2 types of research, production research and utilization research, and put them in 2 watertight compartments?

Mr. SHAW. That is true.

Mr. DIXON. What about this development of starch? How did that involve production research?

Mr. SHAW. To take a case we have had in recent years, it was found there was a character in certain varieties of corn that made what is called waxy starch. There was a market for it, but the then existing corn did not have enough of this material in it to make it economical to recover it. We, together with the State plant breeders, started developing a new type of corn to increase the content of this waxy starch. We improved the corn to the extent that all of the starch was waxy starch, so that it became economically feasible to recover it, and the corn is now being grown commercially.

Mr. DIXON. That is only one illustration out of dozens?

Mr. SHAW. Yes. In almost everything we would be concerned with, you first of all discover in a crop a constituent that would seem to have industrial possibilities. We have learned through our breeding processes how to increase that constituent.

Mr. DIXON. It occurs to me here is one fatal objection to an outside agency managing the research program. In other words, you cannot separate your utilization research from your production research, and the outside agency would have no jurisdiction over production research.

Mr. SHAW. In terms of the Commission's recommendation, that is the way I understand it. I think there would be many and great complications involved. Of course we would all do our best to cooperate with the other agency and try to do the best we could, but it would be difficult.

Mr. DIXON. Of course the Commission did recommend an alternate program, and that is to route the control of the research through the Department of Agriculture with a board, something like a board in a corporation, with rather strong powers in the Department of Agriculture. I did not want the record to show that the Commission just recommended an outside agency. It did put this alternate program

in its report, and furthermore I think the Commission has done a splendid job, do you not think so, Dr. Shaw?

Mr. SHAW. They have done a very fine job, sir.

Mr. DIXON. Their report is a great contribution to agriculture.

Our Secretary has made the statement that our support prices and support program has its place, but it is like aspirin, it relieves the pain but does not cure the patient.

Mr. ABERNETHY. Off the record.

(Discussion off the record.)

RESEARCH AS AN AID TO SOLVE AGRICULTURAL PROBLEMS

Mr. DIXON. It has relieved the pain of the patient but it has not cured the patient. Do you not feel in your heart that this program recommended by the Commission is a far more permanent solution to our agricultural problems than our present support prices, soil bank, and such?

Mr. SHAW. I may be getting over my head here, but the Secretary has stated that he feels the long-range solution to our agricultural problems is research, and certainly I agree with him.

Mr. PETERSON. On that point I would like to express the view that there is not a single answer to the problem of agriculture. This approach certainly affords another addition to the total supply of tools that are needed for agriculture. I do not think we would want to leave the impression, and I do not think the Secretary intended to leave the impression, that price supports as a marketing tool are not desirable in the total kit of tools for agriculture.

If I may make a further comment, I think production research has had two effects. First, the benefits from production research very quickly translate themselves to consumer benefits. While initially it may benefit a particular producer, competition quickly distributes the practice through all similar types of production so that the net effect is to improve the supply or the quality or the character of food that is used by consumers, so that production research, as I have said quickly translates itself to benefits to all people of the country, not producers alone.

Secondly, insofar as production research has increased the ability of the producer to enlarge his output, I think it has kept him in a better competitive position than he would have been had he not been given that ability, and the unit cost of producing his product would have gone up, in view of rising costs.

Mr. DIXON. He can produce now where he can compete industrially?

Mr. PETERSON. It has enabled him to improve his ability to meet rising costs and has given him a better market as well.

Basically what we are discussing here is a determination of how the total research resources of the country are to be divided up among the various areas of need. Whatever expansion there is in this area or another area at this time, manpower will be drawn from some other area; so basically we are talking about how the research manpower of the country should be divided up.

Mr. DIXON. You will notice I asked the question if this utilization research and production research was not one of the permanent solutions.

Mr. PETERSON. We firmly believe it is.

EARMARKING OF FEDERAL GRANT FUNDS

Mr. DIXON. How do you account for the fact that when we had hearings on the consolidation of funds under the Hatch Act last year at the request of our land-grant colleges, the land-grant colleges and other research people came in here and objected to this committee's insistence on earmarking 25 percent of the research for utilization and marketing?

Mr. PETERSON. I could only express the personal opinion that I think it arises from the fact that the backlog of need by producer groups is so extensive they would not like that earmarking done. Personally I agree with that earmarking, but that is the only way I can explain their position.

Mr. DIXON. We appreciate your forthright expression of opinion there. There must be a lot of work done to overcome this lag.

Mr. PETERSON. Both in production and utilization research, it seems to us there is great opportunity for further expansion.

Mr. DIXON. May I ask a few more questions? Am I taking too much time?

Mr. ABERNETHY. No. Go right ahead.

PROBLEMS OF DUAL ORGANIZATIONS FOR RESEARCH

Mr. DIXON. More about the agency; we have already shown definitely that this production research and utilization research cannot be carried on in watertight compartments.

Mr. PETERSON. With that we both agree.

Mr. DIXON. They have to go together; and that an outside agency would lose much of its power to do this because of its failure to have control of production research, while on the other hand the Department of Agriculture, with its supervision of the experiment stations in all the States, would be far more effective in carrying both fields of research along together and balancing the two.

Mr. PETERSON. At the risk of some prejudice, Dr. Dixon, that is our view, sir.

Mr. DIXON. In the second place, we have brought out the fact that trained personnel constitutes one of the roadblocks to our objective as a committee, but that if the Department of Agriculture, through the land-grant colleges, had control of this program, it could take into partnership these students working for their masters' and doctors' degrees and bring up a new generation that is not sold alone on production research, but sold on marketing and utilization research which we need so seriously. That is the second reason why the Department would be the better agency.

What is your reaction to a double-headed organization with a lack of unity of command?

Mr. PETERSON. We think it would create a great many problems. The land-grant colleges would work both with that agency and the Department of Agriculture as they are now. We think when a new agency and the Department came before the Congress for funds, there would be questions as to whether there was duplication and overlapping of efforts. We can see many administrative difficulties as well as the ones to which you make reference.

Mr. DIXON. The first principle in effective organization is unity of command.

Mr. ABERNETHY. Will you yield there?

Mr. DIXON. Yes.

Mr. ABERNETHY. Do we not have such a controversy right now existing between the Extension Service, the Soil Conservation Service, the ACP program, and the Farmers' Home Administration?

Mr. PETERSON. Conservation activities, Mr. Chairman, are widely dispersed among a number of agencies and in a number of programs, and I must say, in all fairness, there is administrative difficulty in keeping both program responsibility and policy identified between the agencies having responsibility in that field.

Mr. ABERNETHY. And there is overlapping responsibility?

Mr. PETERSON. There is some.

Mr. ABERNETHY. The argument has been advanced—and I think it is sound and good—that that might be a good thing because of the competitive spirit that it promulgates within the agencies encouraging each to do a better job than the other.

Mr. PETERSON. There may be some advantage in that, Mr. Chairman, but it has been my observation that the contrary is true because, for whatever the reason, the various agencies spend a good deal of their time determining whether the other is in their particular field of responsibility or not. We have these problems which I think are inherent in big government.

Mr. DIXON. That seems to be the great point of difference, it seems to me, between the Commission and some members of our committee, on the agency. The fourth point would relate itself to the competition between this outside agency and your present experiment station program of research going on in the States. The bill which our chairman, Mr. Abernethy, has introduced would permit the agency to go outside and beyond civil service for 100 of these specially qualified research people. Would not the outside agency go into the State experiment stations, with this additional money and power, and tend to wreck your research program?

Mr. PETERSON. A response to that question at this time I think would be speculative. It depends on the authorities and the definition of the authorities which Congress might define in connection with whatever legislation is before it.

Mr. DIXON. It seems to me that would be the case, and I have quite a bit of proof here if I might submit it, Chairman Abernethy.

I have a letter from R. E. Patterson, secretary of the Texas Experiment Station; James E. Kraus, dean and director of the station at the University of Idaho; J. H. Longwell, University of Missouri; W. B. Young, dean and director, College of Agriculture, Connecticut; Albert S. Curry, New Mexico College of Agriculture; Frank J. Welch, University of Kentucky; F. E. Price, Oregon State College; and I have here somewhere if I can find it a letter from the executive committee of all the 48 land-grant colleges.

Mr. ABERNETHY. Doctor, do you wish to make those a part of the record?

Mr. DIXON. Would you advise that?

Mr. ABERNETHY. If you desire. They will be inserted at the appropriate point in the record and, incidentally, I have some communications along similar lines which I may wish to insert in the record. If there are other members of the committee who have information they may wish to insert they may do so.

Mr. DIXON. This letter from the Land Grant College Association I would like to file, and also the statement from the gentlemen of the Department that they are in full accord with the recommendations of the President's Commission with one exception, or maybe two exceptions. I am sorry I do not have the resolution right here, but one is that the program should be administered through the Department of Agriculture; and the second one, which refers to Mr. Abernethy's bill, they seem opposed to having these 100 specialists employed outside of the civil service.

(The documents above referred to are as follows:)

TEXAS AGRICULTURAL EXPERIMENT STATION,
College Station, Tex., May 2, 1957.

Hon. H. A. DIXON,
House Office Building,
House of Representatives, Washington, D. C.

DEAR MR. DIXON: At its meeting in Washington, D. C., April 24 and 25, the Experiment Station Committee on Organization and Policy considered your letter of April 15 which you sent to each member—and directed me as its secretary to convey to you the thoughts and action taken.

Enclosed is a copy of a recommendation concerning the interim report from the President's Commission on Increased Industrial Use of Agricultural Products that was adopted by the Experiment Station Committee on Organization and Policy and forwarded to the executive committee of the American Association of Land-Grant Colleges and State Universities for consideration and appropriate action. From this recommendation you will note that the committee is aware of and recognizes the need for expanded research on new and increased uses of agricultural products. Furthermore, State agricultural experiment stations are willing and in an excellent position to assume greater responsibilities in this area of research.

The Experiment Station Committee on Organization and Policy is in full agreement with your H. R. 6800, and your letter of April 15, 1957, that administrative authority for the research program and disbursal of funds appropriated for this purpose be vested in the United States Department of Agriculture. In line with your good talk, copies of which you so kindly made available to us, we believe with the existing relationship between the United States Department of Agriculture and the research and educational agencies of the land-grant colleges and State universities, the entire program of utilization research would be greatly strengthened. Existing facilities at the State level could be fully utilized for the expanded program and at the same time provide a training ground for the greatly increased number of scientists that will be required in this area.

You will also note in the attached recommendation that new positions set up to carry out the provisions included in any new legislation should be consistent with the salary and grade provisions in force in other segments of the United States Department of Agriculture. In the case of contract research or grants-in-aid, the salary provisions would be those of the contracting or cooperating institutions.

We are greatly appreciative of your interest in the problems of agriculture and the efforts you are making toward finding a satisfactory solution to them. We also appreciate your letter of April 15, 1957, and the material you enclosed.

Very truly yours,

R. E. PATTERSON,
Secretary, Experiment Station Committee on Organization and Policy.

RECOMMENDATION CONCERNING THE INTERIM REPORT FROM THE PRESIDENT'S COMMISSION ON INCREASED INDUSTRIAL USE OF AGRICULTURAL PRODUCTS

Adopted by Experiment Station Committee on Organization and Policy April 24 and 25, 1957, Washington, D. C.

The Experiment Station Committee on Organization and Policy has long been aware of the need for increased research on industrial utilization of agricultural products and has been appraised of developments leading to proposed legislation that would provide funds for support of research in this field.

The committee is especially aware of the exhaustive study made by the President's Commission on Increased Industrial Use of Agricultural Products, and on

the basis of verbal reports and preliminary examination, we wish to commend the Commission for its careful and thorough study of the problem assigned.

The State agricultural experiment stations have recognized the need for this type of research for a considerable period of time and have been working on various aspects of it to the extent that limited funds and qualified personnel made possible. They are willing and in an excellent position to assume enlarged responsibility in this area.

We agree in general with the recommendations of the Commission and compliment them for their recognition of the need for providing for the training of additional personnel as indicated in the third recommendation. However, because of the existing administrative structure within the USDA and the relationships between the Department and the State agricultural experiment stations, we believe that administrative authority for approval of research projects and disbursal of funds to be made available through new legislation should be vested in the USDA and that a separate agency for this purpose not be created. New positions set up under this plan should be consistent with the salary and grade provisions in force in other segments of the USDA. In the case of contract research or grants-in-aid, the salary provisions would be those of the contracting or cooperating institutions.

Mr. DIXON. The Executive Committee of the American Association of Land-Grant Colleges and State Universities also adopted this resolution.

I have received letters of support from land-grant college leaders from all parts of the country. Typical of these is the following letter from Dean F. E. Price at Oregon State College telling of the supporting resolution of the Western Experiment Station directors.

OREGON STATE COLLEGE
Corvallis, Oreg., April 30, 1957.

Hon. H. A. DIXON
House of Representatives,
441 House Office Building Washington, D. C.

MY DEAR MR. DIXON: I wish to thank you for your letter of April 15 and the attached material on utilization research. The land-grant college agricultural experiment stations are very much interested in the plans that are being developed for research in this area. I am very pleased to learn that you are proposing that provisions be made for the fullest participation in the research program of the agricultural experiment stations. The Western Experiment Station Directors, at their midwinter meeting in Berkeley, Calif., last March, passed a resolution urging the Commission to give full consideration to the State agricultural experiment stations and the Agricultural Research Service of the USDA. We feel that it would be unfortunate to set up a separate competing agency to handle utilization research. Just where such an outside agency would get technical staff would also be a problem for which no one has an answer at the present time, I think.

Due to matters I had pending before our State legislature, I was unable to attend the Experiment Station Committee on Organization and Policy which met in Washington, D. C., April 24 and 25. If you desire any further information from that committee, I would suggest that you direct your communications to Director J. H. Longwell, Division of Agricultural Sciences, University of Missouri, Columbia, Mo.

Very truly yours,

F. E. PRICE, *Dean and Director.*

SPEEDUP OF RESEARCH PROJECTS

Mr. DIXON. If I may continue, I believe you made reference to about 110 projects that were in the test tubes that have great promise and that, if given a little encouragement, could be developed commercially in your opinion, did you not?

Mr. SHAW. We have a number of projects similar to the one I discussed on dialdehyde starch that are about in the same situation. We are working on a broad front. We have in most cases only 1, 2, or 3 scientists working on a particular product, and with that extent

of effort it will take sometime to commercialize the results. An expanded effort would speed it up; yes, sir.

PROPOSED VISITS TO UTILIZATION RESEARCH LABORATORIES

Mr. DIXON. I was wondering, and I have spoken to our chairman about it, if the subcommittee decided it was worthwhile to visit 1 or more of these 4 research laboratories, what would be your idea of the worthwhileness of such an undertaking, and would we be invited?

Mr. ABERNETHY. I might say that Assistant Secretary Peterson called me about that about 60 days ago, I guess it is my fault that I have not passed on to the committee the invitation of Secretary Peterson to make such a visit. I think it would be very worthwhile, and I am sure the employees and administrative officials of the laboratories would welcome such a visit. I hope maybe this year after the adjournment of Congress we may do so. I have never visited the laboratories and would like to visit them and get some first hand knowledge of the work they are doing.

Mr. PETERSON. We would be delighted to have the full committee or as many members as possible visit the laboratories at any time. That is a standing invitation.

Mr. JOHNSON. Off the record.

(Discussion off the record.)

Mr. PETERSON. You have a standing invitation at your convenience to visit our laboratories at any time.

Mr. ABERNETHY. I would like the record to show that Congressman Harvey of Indiana has expressed a tremendous interest in this matter and also in visiting the laboratories, and it was soon after he discussed it with me that Secretary Peterson called about it.

I want the record to show also that we appreciated your call, Mr. Secretary.

Mr. DIXON. Congressman Harvey should be given credit for introducing the bill last year.

Mr. ABERNETHY. That is right.

DETERMINATION OF RESEARCH PROJECTS

Mr. HAGEN. You have given us this list of developments here. Who determines what projects you will engage in? What criteria do you have?

Mr. PETERSON. There is a review procedure within the Agricultural Research Service. Perhaps Dr. Shaw could go into that in more detail.

Mr. SHAW. Beginning with the passage of the Research and Marketing Act back in 1946, we have had established in the Department advisory committees to assist us in evaluating all our research problems.

Those advisory committees are set up usually on a commodity basis, one for grain, one for livestock, and so on. They review with us the research we have underway as well as any new proposals and changes in the program that may be desirable, either expansions or curtailments or the addition of new programs.

Each year the advisory committees give us their recommendations in a priority order, 1, 2, and 3, and so on. That is used as a very great

guidance to us in the pursuit of our projects. We are having consultations always with farmers and with different segments of industry in terms of the problems that are facing them, and we try our best at all times to work on the projects that seem to be most important to the users of our results.

Mr. HAGEN. In most instances do not the suggestions come from the outside, some university chemist decides it would be a good subject for research?

Mr. SHAW. We have in our laboratories scientists engaged in this work, and very frequently the first notion that this is a field that is worth exploring would come from that scientist in the laboratory. That suggestion is reviewed by our advisory committees, and we get their views whether this one is more important than the next one and so on.

At the same time we will have subjects come to us from the universities and we take those into account. What we try to do with our advisory committees is lay before them all the suggestions we have accumulated, and they are invited to bring the suggestions they have.

DEVELOPMENT OF NEW PRODUCTS FROM AGRICULTURAL COMMODITIES

Mr. HAGEN. I have a constituent who is not a scientist but he has done a great deal of work on the utilization of cotton stalks in the manufacture of wallboard, and he has some wonderful looking wallboard that has been produced from cotton stalks. I think the actual scientific work was done, partially, at least, under a contract with Kaiser industries. That opens up a new field for cotton farmers.

Have you done anything yourselves along that line?

Mr. SHAW. I do not know that we have worked on cotton stalks, but we have worked on sugarcane stalks and wheat straw.

Mr. IRVING. We have done nothing but preliminary work to show that the behavior of cotton stalk is similar to that of wheat straw and other products. There is no serious technological problem. The only problem is an economic one; whether the collection and transportation and other costs would permit the economic development of such a product.

Mr. HAGEN. In your research you would go into that too. What I am trying to establish is what would be necessary to get you to undertake a program of research in the utilization of cotton stalks in the manufacture of wallboard and/or paper.

Mr. JOHNSON. Have you not found in most of those cases the cost of transportation, collecting, and so on is so much that probably what the farmer gets for his product is nil?

Mr. IRVING. That is correct.

Mr. JOHNSON. The farmer has to practically give it to them.

Mr. HAGEN. I am told they can produce this wallboard from cotton stalks cheaper than from forest products.

Mr. DIXON. In the United States or abroad?

Mr. HAGEN. I would like to encourage you to look into the feasibility of Government research on this subject, because it would in my judgment open up a new outlet for the cotton farmer. This particular fellow told me he can conceive at some time they might grow cotton just for that purpose.

Mr. SHAW. We certainly will look into the particular aspect you have mentioned. We do have a unit at our laboratory at Peoria that

is working on agricultural residue, particularly on paper, wallboard, boxes, and so on, uses of the material in that way.

As Dr. Irving has mentioned, the economics, the cost of collecting and transporting the materials, has usually ruled them out.

Mr. HAGEN. This fellow has also developed a method of harvesting these cotton stalks.

I notice in this list of accomplishments, under cereal and forage crops, you have developed a new textile fiber from corn protein.

Mr. SHAW. Yes.

COMPETITION FROM INDUSTRY

Mr. HAGEN. Do you encounter any resistance from companies like Du Pont and some of these others to putting in operation this agricultural raw material as contrasted with their current raw material?

Mr. SHAW. They will consider us as another competitor, there is no question about that, but we have had no serious repercussions from them. The particular fiber that is mentioned there is one called zein. It is a fiber that makes a fabric that is different from other fabrics that are in use. It has had a fair market. I do not know that any specific objection has been made to our development.

Mr. DIXON. Will the gentleman yield? Has not the research of industry put us on the skids as far as the utilization of farm products? Take for example the manufacture of rubber from grain. Plastics, with a petroleum base, have taken most of our leather market. Detergents have taken away over 60 percent of our market for animal fats. That is one of the troubles with our livestock industry. Is it not time now that we were waking up to get our markets back?

Mr. HAGEN. In that connection, this new textile fiber from corn protein, has any large processor manifested interest in putting that to use?

Mr. SHAW. There is one manufacturer who makes the fiber now in substantial quantities. In the general area of the question, industry, of course, is interested in making whatever product it has in mind out of the cheapest raw material it can find. That has been one of our difficulties, that agricultural products are generally more expensive than petroleum, for example. But we find at times some unique product that we can make competitively.

As Dr. Dixon has pointed out, detergents took away a lot of our fat market, but we have found we can modify our animal fats so that we can bring them back in the detergent picture and also in the plastic field. We feel we are going to have to do research in agriculture just to hold our own, and if we are going to get ahead we have to do even more.

Mr. HAGEN. I would suspect it is a problem when you have the interlocking directorates between the oil and other industries.

Mr. SHAW. Some chemical industries are spending on research a high proportion of their income—I do not remember the figures exactly—but it is probably in the neighborhood of 10 percent.

Mr. DIXON. The average is better than three.

Mr. SHAW. For all industry.

Mr. DIXON. For all industry, but some industries go above 10 percent.

Will the gentleman yield?

Mr. HAGEN. I am all through.

Mr. DIXON. Industry is doing its research and has put our farm markets on the skids in certain respects. Why not say, "Let the farmer do the same thing?" Why should the Government in any way intercede?

Mr. SHAW. The individual farm unit is too small an enterprise to afford the research that is necessary to compete in the market with the large industrial units that we have, so that there has to be some collective means for handling the problem of the farmers. Personally I think the general public gets sufficient benefit from the results of research and other means of helping the farmer to justify it.

Mr. DIXON. I wish to compliment the Department on its exhibit down there now in the lobby which shows a bar graph of the farm commodities market. On the end there is a little white bar showing that only 7 percent of all the farm commodities are marketed through industry.

Then it has 100 little balls rolling, and 93 of these little balls go into the stores and the marketplace, and only 7 out of the 100 little balls go into industry.

Dare you venture a speculation about how much that 7 percent could be increased if you are given a chance, through the passing of legislation like the President's Commission recommendations?

Mr. SHAW. I would not want to speculate on it. I feel certain that we could expand the proportion of our products going into industrial uses. We must remember at all times, however, that industry will still be in there competing with us.

We get a new product made out of an agricultural material, then they will try to make that same thing out of petroleum. We have got to be in there fighting for the markets, and I think that we can get a much higher proportion of our farm produce going into industrial uses than we now have.

Mr. DIXON. Dr. Shaw, there are many results of your research which have more than liquidated the cost of all your research laboratories since they started in 1942. They are getting $16 million this year. Back a few years ago they were only getting $3 million, were they not?

Mr. Shaw. Yes, sir.

RESEARCH PAYS OFF

Mr. DIXON. Can you name some individual fruits of research that more than paid the cost of all of our utilization research since the program was begun?

Mr. SHAW. I can name one product that would do that. Certainly frozen concentrated orange juice would go a long way to being a payoff for the costs of all research.

Mr. DIXON. Half of the Florida product is sold now in those juices?

Mr. SHAW. Yes, sir.

Mr. DIXON. And their crops are worth $100 million a year?

Mr. SHAW. Yes. On a conforming bandage, we saved the military, in terms of their purchases of bandages, enough money to more than pay for what we spent at our southern laboratory on its development.

It is hard to evaluate what the benefit to the Nation has been of such a thing as the commercialization of penicillin, but I think the Nation has been benefited enough to pay for all we have done.

Mr. DIXON. You only had enough penicillin for 400 cases when they brought the gentleman from England. What was his name?

Mr. SHAW. Dr. Florey. Dr. Fleming was the man who discovered it in England. Then Dr. Florey came to us to help get it on the market.

Mr. DIXON. And after 2 years, Dr. Irving?

Mr. IRVING. It was three at the outside when it was available in substantial quantities for the military.

Mr. DIXON. To cover all circumstances. That one thing alone, I imagine, has been worth more to our country than all the cost of these laboratories since they started in 1942, 100 times over.

You could go on and cite many more, could you not?

Mr. SHAW. Yes.

Mr. DIXON. It would have liquidated the whole cost of our research.

Mr. SHAW. I think I could sum it up by saying that research is not a cost. It is an investment; that we get returns manyfold over the cost.

Mr. ABERNETHY. Mr. McIntire?

BASIC, APPLIED, AND DEVELOPMENTAL RESEARCH

Mr. MCINTIRE. Dr. Shaw, am I putting it in layman's language reasonably correct by saying this whole field might be divided into three divisions? One would be basic research. We understand what that is. That is just more or less the elementary chemistry involved.

The other is the moving of it through the laboratories, and applying it. The third point is moving it out close to the area of determining its practical economic aspects in what might be called the laboratory, or pilot plant, in the formula or in the technique.

As you appraise our current situation in this broad field, all 3 are important, I realize, but just which of the 3 is perhaps the area of justifying the greater emphasis at this time? In other words, do we have enough which is now out of basic research onto the laboratory table, but need to move it over into the pilot-plant stage, or do we have enough that is all ready to move off the bench, and we do not have an opportunity to pilot-plant that, or are we doing the second and third quite adequately with the amount of material flowing out of basic research and we need the basic research?

Mr. SHAW. At the present time we do have processes at a stage where they could be pushed in pilot-plant and developmental work so that the effort could be expanded in that direction.

I would want to see, myself, all three of the phases you mentioned go forward simultaneously, because the basic research is where you get all the new ideas. It is the cheapest thing you do. Of the 3 phases, it is about 5 percent of the cost.

The pilot plant is another 25 percent of the cost, and this third commercialization and development phase would be 70 percent of the cost.

Mr. MCINTIRE. We are still keeping this within the research program.

Mr. SHAW. Yes.

Mr. MCINTIRE. When you speak of "commercialization," I do not include that.

Mr. SHAW. I was thinking of the development through the pilot-plant stage. I think there is a need for more pilot-plant work than

we now have, to balance with the rest of our program. I would say that, but at the same time we have got to keep feeding in ideas at the other end in order to have more to commercialize as we go along.

I would like to see all three phases of the work that you have indicated go forward together.

Mr. McIntire. Well, it must. Do we have more ideas than pilot plants to work them with right now?

Mr. Shaw. We have today.

NEED FOR NEW RESEARCH FACILITIES

Mr. McIntire. Then at the moment the need for extra facilities to further prove what is in the test tube, that which has already been research basically and is in the test tube with full knowledge of what we are working with, but right today you are blocked somewhat on getting that into its practical interpretation in the pilot plant?

Mr. Shaw. We could move products faster with the pilot plants.

Mr. McIntire. Could you make an observation on the point I think Mr. Hagen and Dr. Dixon were discussing in relation to this cotton plant thought? It strikes me that by the very nature of agriculture, and the fact that we are moving from what is mostly agricultural use, we will say, through the normal marketing process, into an industrial utilization.

How far do you think funds appropriated for research should go in getting this through into a commercial operation? Do you have some thoughts as to guidelines? Surely up to an appropriate pilot planting on the practical scale, which of course becomes controversial as to what a practical scale is, but what is your thought as to the point where research should be appropriately, under a policy, released from its responsibility, and private industry, you might say, pick it up from there?

Mr. Shaw. At the present time, we do carry things through a pilot-plant stage—a small pilot plant, in our laboratories. At that stage, we try to interest a processor of some industry in the product. When we are successful in interesting one, then we have our people go into his plant and assist him in getting the thing set up and going, but he is bearing the expense, except for the advice that we give him from the scientists who have been working on the particular project.

We have not gone any farther than that. I would interpret the Commission's report to suggest that we should go further than that, but we have not done it up to the present time.

Mr. McIntire. Of course, I think there are always certain hills to get over as we move along, and a very substantial hill in this whole situation is to get over the hill of the capital investment in new enterprise, which is just moving out from the pilot plant into a commercially competitive enterprise.

I think you will see much more of it than I do. I see a little of it, where there is, as far as any research work is concerned, a perfectly merchantable product, and the demand has been tested, but to attract the necessary capital, which is venture capital, into that thing, becomes a real problem.

Your policy is that you feel you should be in a position to carry your assistance in an advisory capacity—technical advisory capacity—over into the commercial enterprise, to the extent to which you can be helpful without being a part of it?

Mr. SHAW. Yes. Take one of the matters that you are familiar with, potato flakes and potato granules. The granules are on the market now. The potato flakes we think are coming on the market. We produced quantities of those in our own laboratories, as we could, through our pilot plant, but we still only have a handful of product. In order to get any market test you have to get some industry interested to develop it. We take all the know-how that we have and make it available to anyone that we can interest in doing this commercially.

We give guidance along the way. We would offer that to any competitor that he might have. It is freely available to everyone.

We have not done the actual commercial plant operation ourselves.

Mr. MCINTIRE. One other question, Mr. Chairman: I am sure that it is a perfectly natural characteristic for industry groups, commodity groups, production groups in any one State to think in terms that the research in relation to that commodity should be done in that State and, of course, our land-grant colleges, being a State institution, find themselves with an obligation to the people who support it within the State.

Your regional laboratory, as now set up, of course, is functioning on a regional basis, where you have got regional projects within commodity groups functioning outside of laboratories, and using facilities, perhaps, within the region where there are people who are specialists of a little more degree in that commodity in that region.

What do you see in a substantial expansion of research in agriculture in compounding that problem, of being able to regionalize the research in a manner to get the minimum of overlapping of research, because of the fact that commodities are produced in a number of States?

Mr. SHAW. In the statement I made indicating that if there was to be a substantial expansion in this field, we thought the current facilities that we had should be doubled.

I meant doubled at the site.

Mr. MCINTIRE. That is, four laboratories?

Mr. SHAW. Yes; facilities doubled at that site rather than creation of another site, simply to get the benefit of having the various scientists that are working together to be able to pool their efforts on one project.

There will always be in this situation necessities to adapt your results to areas. We have had the most wholesome relationships with the land-grant colleges working on these regional projects; the experiment-station directors of each region meet with us as a board of advisers at our laboratory.

We consider our projects together and usually we wind up that some part of it can best be done at the Philadelphia laboratory, some part of it can be done at one or another of the colleges, but we are working together as a team in trying to push the whole effort.

Mr. MCINTIRE. You are then saying, I believe, that even if there was a substantial increase in the volume of funds available for research, that this type of situation would not necessarily be more aggravated than exists today, which is in a very manageable proportion today?

Mr. SHAW. Yes. I do not think it would be aggravated. I think we could manage it in the same framework that we are now running our program, and could keep it well under control.

Mr. MCINTIRE. Thank you, Mr. Chairman.

Mr. ABERNETHY. Mr. Harrison.

Mr. HARRISON. I feel the field has been pretty well covered at this point.

ESTABLISHMENT OF AN ADVISORY COMMISSION

Mr. Secretary, I do not know whether I understood you correctly or not when you said, or I thought that you said, that there should be an advisory commission within the Department, rather than an advisory commission outside the Department; is that right?

Mr. PETERSON. I did not comment on that point, as I recall, Mr. Harrison.

The Department, I think, would view an advisory group, if the Congress determined that one should be created, within the Department much more favorably, as my testimony indicates, than for an independent agency.

Mr. HARRISON. Were a commission appointed, it should be within the Department?

Mr. PETERSON. If one should be appointed, we think it should be within the Department.

EXPANDING EXISTING FACILITIES FOR RESEARCH

Mr. HARRISON. Would it be your feeling, in order to expand the program at the present time, that we use the facilities that we already have, rather than expanding in some other regions?

I refer to the four facilities that have been mentioned. You feel that a greater amount of money should be appropriated for the use of these particular research laboratories?

Mr. PETERSON. It is our view that the structure for the conduct of research, which we have within the Department, is capable of absorbing any expanded effort that the Congress may authorize. So far as an expansion of physical facility is concerned, we would view the expansion of existing physical facilities as a first priority, rather than the construction of additional physical facilities.

HIGHER SALARY SCALE FOR SCIENTISTS

Mr. HARRISON. It has been mentioned that possibly one item is that of paying a sufficient amount of salary to the scientists. Is there any way to reach a conclusion on what we should pay in order to do the job that we want to get done, to make further use of our agricultural products through industry?

Mr. PETERSON. That problem has been, and is now, under study, as I understand, within the executive branch, Mr. Harrison. It is a troublesome problem. As we said earlier, all scientific manpower is presently employed somewhere. There is competition for certain types of scientific manpower and as that competition intensifies, obviously the value in terms of salary goes up.

We are finding it difficult to compete within the entire Government, as well as the Department of Agriculture, for certain classes of scientific manpower.

The colleges are, of course, graduating scientists. The supply has not yet caught up with the demand. It is our view that the salary level, as a minimum for certain classes of scientific manpower, needs to be considered. It is my personal view that the entire level for scientific manpower must be considered at one time.

Mr. HARRISON. More money would possibly attract more scientists in this particular Department that we feel is so important at the present time?

Mr. PETERSON. The authority to pay additional salaries, within at least the scientific leadership positions—the people who would be responsible for certain areas of work—I think is particularly important. I would not like to suggest that the whole category of scientific manpower be raised for this special work without regard to other categories, but I do think it would be highly necessary that certain classes of manpower that might be utilized in any expanded effort, including that which is now being conducted, be above whatever the general level is, so that we can reach out and get the best qualified men we can find for a particular position of leadership responsibility in scientific endeavor.

Mr. HARRISON. I think it has been brought out here that we, in Government, are at a somewhat lower level than is industry in this particular field.

Mr. PETERSON. That is the case at the present time throughout the Government, as I understand the facts.

Mr. HARRISON. That is the one place I think we could possibly raise our sights a little and maybe increase our efficiency.

As Mr. Dixon brought out, 50 cents of each $100 gross is used in research. Who determines the proportion of that which is to be used for production, and the proportion that is to be used for the utilization of our products?

DETERMINATION OF FUNDS FOR PRODUCTION AND UTILIZATION RESEARCH

Mr. PETERSON. In general terms, when a budget is being formulated, the research agencies of the Department—with the various review procedures which they have within the agencies—make a recommendation for the inclusion in a given fiscal year's budget of where the expenditures should be made. That is reviewed within the secretary's office.

There is usually subsequent review and consultation with the agency.

Ultimately, the final responsibility, of course, rests with the Secretary of Agriculture, when he presents his budget for the Department through the usual budget processes.

Mr. HARRISON. It seems as though at this particular time we have reached a point where there should be a greater amount of this, rather than 45 cents going to production and 5 cents going to utilization. There should be more nearly a balance.

I realize, too, from what has been said, that the two may not be in watertight compartments. We must recognize each of them. It would seem with the situation as it now exists, that we could spend a great deal more of that 50 cents, if the 50 cents is a logical amount, toward the utilization.

Mr. PETERSON. That appears to be a logical conclusion, Mr. Harrison. I should prefer to express it this way: That research, through experience, both in agriculture and in industry, has proven its usefulness in the competitive economy in which all business, including agricultural production, must function.

I think our problem is to determine what level of research is required to keep farm producers, and producers of farm commodities,

in the maximum possible competitive position, where they can get the things they need out of the economy, on the equivalent basis with other people working in other lines of endeavor.

I think there is another implication here that has not been yet mentioned, and that is that to the extent the farmer finds his competitive position in the total economy lessened, he is then compelled, by economic circumstances, to mine some of his capital in the form of his land resources.

I think that has an effect upon the conservation of land resources. Most of our lands are in private ownership. Most of them are in farm ownership, generally speaking, and I think it highly important that we do whatever we can do to keep the farm producers of this country in a competitive position in the economy.

I think research, which relates both to production and to marketing, and this utilization research has pointed at expanded markets in utilization, has potentially a major impact on keeping the farmers in a competitive position. That, in turn, has a relationship to their ability to refrain from mining their physical resources of land.

Mr. HARRISON. I agree with you, that we are going to have to be competitive. I am wondering if we can be competitive with industry, with the amount of money that is being spent for utilization. It is quite evident that if we have a market for our surpluses that we are building up at the present time, we are going to have to take that market away from someone else.

Mr. PETERSON. That may or may not be true, Mr. Harrison. If we can find a new product, a new use that has acceptability, both in domestic and the foreign market, one or the other, or both, as industry does, we merely improve the total standard of living, and the total consumption by people of goods and services attendant to the production and distribution, it seems to me, without necessarily taking a sales opportunity away from some other segment.

Confining this observation to research alone, I think the facts are obvious that agriculture is not in a competitive position in research with other segments of the economy of the country at the present time.

Mr. MCINTIRE. I want to make an observation off the record.

(Discussion off the record.)

Mr. ABERNETHY. Mr. Harrison has another question.

RESEARCH CONTRACTS

Mr. HARRISON. I would like to ask a question with reference to research that is going on in the laboratories, the four laboratories that you have and in the land grant colleges, and if I understand you correctly, it is true that some of this research is done on a contractual basis with universities and other schools throughout the country?

Mr. SHAW. Yes. Approximately a half million dollars a year is now spent for contracts with the universities and other research institutions.

Mr. HARRISON. That has been highly successful? I would think so, because you would have the advantage there of well trained scientists, I would think, in the universities.

Mr. SHAW. We have had very satisfactory experience.

Mr. HARRISON. I would think that would be a good place for expansion.

Mr. SHAW. Yes, sir.

Mr. HARRISON. Thank you.

Mr. DIXON. One short observation.

Mr. ABERNETHY. Yes?

Mr. DIXON. I wonder if the Secretary would not like to explain to the subcommittee the recent reorganization in the Department, to give emphasis on this kind of work that we are discussing here.

REORGANIZATION OF RESEARCH

Mr. PETERSON. We, of course, are generally in a constant state of review of the efficiency of our operations, Dr. Dixon, in the Agricultural Research Service. We had been expanding our budgets in the utilization field, giving increasing attention to it both in terms of budget and in terms of internal study and attention to our administrative organization.

In administrative jargon, we have shortened out our administrative line, provided better control of our research effort and given additional emphasis to utilization research by making it a primary unit, of which Dr. Irving is the head, within the Agricultural Research Service.

Mr. DIXON. Thank you.

Mr. ABERNETHY. Mr. Heimburger?

Mr. HEIMBURGER. I have just one question I wanted to ask Secretary Peterson, but it would take some time, I am afraid, to develop the discussion to the point where the question would have any meaning. Since time is growing short, if you prefer, I will defer this to a later session.

Mr. ABERNETHY. I am perfectly willing to listen myself. If the others have to go, that is perfectly all right. While we have Secretary Peterson here, perhaps you had better proceed. If some of the other members have to leave, that will be understood.

SETTING UP A NEW ORGANIZATION FOR UTILIZATION RESEARCH

Mr. HEIMBURGER. Mr. Peterson, my question, when I get to it, will involve the desirability of setting this proposed utilization research up as a separate entity, or agency, within the Department of Agriculture.

I may start off by saying that I think your second paragraph on page 4 is one of the most significant statements you have in your testimony this morning, where you say:

> It is the view of the Department that the present administrative organization for the conduct of agricultural research is capable of absorbing and effectively applying the program of utilization research, such as that which the committee appears to envision.

Just to get a little background, I went and dug out of my old files and have here in my hand the very original copy of the bill, which became the Marketing Act of 1946. This I whacked out on a typewriter up on the fifth floor of the Old House Office Building, so that I have some background of interest, at least, in this field, and with your permission, and yours, Mr. Chairman, I would like to go back there just a little bit.

The idea of research, the way you go about it, and the means through which you operate, certainly is not new. As was pointed out many times in the discussion and statements and the speeches which made

up the legislative history of the Research and Marketing Act, this was nothing new, as far as procedures and machinery are concerned.

What the Research and Marketing Act tried to do was to change the emphasis. Ever since there has been a Department of Agriculture we have been conducting research in production and we have been rather successful in achieving results.

As I understood the intention of the Research and Marketing Act—and I think I did understand it; that is why I showed you the original draft here—it was not to set up new machinery. It was to change a point of view; to change emphasis and to place the emphasis on the disposal of those agricultural products which our very research had taught us so well how to produce.

I think it is quite significant that, in spite of the intention of that act, the broad purpose of it, that as Dr. Shaw stated, and Mr. Harrison just remarked, today only 5 percent, or 5 cents—what is it, 5 cents out of 50 cents goes to utilization; about 5 cents out of 50 cents to marketing?

Mr. SHAW. I was giving the figures for both the Department and land-grant colleges combined when I gave those figures. The percentages on marketing and utilization in the Department are much higher than that.

Mr. HEIMBURGER. That is the whole research program of the Department, and the land-grant colleges. At this time, then, it would run about 21 cents out of 50 cents, or 42 percent of the money being spent for utilization, marketing and nutrition research; is that correct?

Mr. SHAW. Currently, out of a total expenditure of $73 million for research in the Department by its agencies, we are spending in fiscal 1957 $9 million on marketing, $16 million on utilization, and $47 million on production.

Mr. ABERNETHY. Can that table be made a part of your testimony, Doctor?

Mr. SHAW. Yes, sir. This table that I read from has figures for the last 10 years, from 1947 up to and including 1958.

Mr. ABERNETHY. I think this would be an appropriate place for it, Mr. Reporter.

(The table referred to follows:)

Estimated obligations for research by agencies of the Department of Agriculture and funds for State agricultural experiment stations fiscal years 1947–58 (budget estimates)

[In thousands of dollars]

	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958 budget estimates
Production research	$21,916	$23,064	$27,548	$27,730	$26,859	$27,691	$28,255	$29,084	$33,759	$37,443	$47,853	$53,571
Utilization research:												
New and improved uses:												
Farm products	5,848	7,944	8,331	8,942	8,385	8,315	8,007	8,097	9,182	9,581	12,321	14,297
Forest products	1,552	1,259	1,193	1,424	1,298	1,245	1,253	1,215	1,261	1,572	1,956	2,225
Subtotal	7,400	9,203	9,524	10,366	9,683	9,560	9,260	9,312	10,443	11,153	14,277	16,522
Home economics	1,165	1,234	1,620	1,838	1,540	1,495	1,432	1,366	1,436	1,543	1,840	2,183
Total, utilization research	8,565	10,437	11,144	12,204	11,223	11,055	10,692	10,678	11,879	12,696	16,117	18,705
Marketing research	2,238	3,516	5,357	5,779	5,270	4,802	5,149	5,213	6,627	7,563	9,180	10,773
Total, research by USDA agencies	32,719	37,017	44,049	45,713	43,352	43,548	44,096	44,975	52,265	57,702	73,150	83,049
Payments to States	7,206	9,677	10,719	12,698	12,716	12,670	12,696	13,722	19,454	24,754	29,504	34,004
Total Federal funds for research	39,925	46,694	54,768	58,411	56,068	56,218	56,792	58,697	71,719	82,456	102,654	117,053

NOTE.—Adjusted for comparability with appropriation structure in 1958 budget estimates.

Mr. HEIMBURGER. Mr. Chairman, to show you how far this expenditure falls short of the goal, which Congress had in mind when they passed this act, in title 2, which is the Marketing Act alone, there is not only an unlimited open-end authorization for appropriations, but there is a scale which was held up as an objective to the Department of Agriculture to achieve in this field of research. I would like to read it to you:

> $2,500,000 for the fiscal year ending June 30, 1947, and each subsequent fiscal year; an additional $2.5 million for the fiscal year ending June 30, 1948, and each subsequent fiscal year; an additional $5 million for the year ending in 1949 and each subsequent year; an additional $5 million for the year ending June 30, 1950, and each subsequent year; an additional $5 million for the fiscal year ending June 30, 1951, and each subsequent year.

In other words, back in 1946 when the dollar was worth considerably more than it is now, Congress said to the Department, "Please use $20 million. Please get this thing up to $20 million in 4 years and then keep on going."

As Dr. Shaw has just stated, it is now up to $9 million. The original drafts, and the first committee prints of this bill, not only authorized, but directed the establishment of a completely separate agency in the Department to administer this new emphasis—this new look. That is all it was to do, to use the same old machinery but let us have a new look with it.

The only reason why the language directing the Secretary to set up a separate agency did not appear in the bill as it was reported by the committee to the floor, was that the then Secretary of Agriculture came up and said:

> Please do not put me in shackles. Please do not direct me. I agree with the objective. You authorize me to do it and I will do it.

It was not done, and I do not blame the Secretary entirely for it. It is part of the inescapable environment of government that kept him from carrying out what I know was a sincere promise to the Committee on Agriculture; but it was not done. May I say, Mr. Peterson, that in the last 2 or 3 years there has been more of an approach to the objective of a separate marketing agency in the Department than there was in the interim between 1946 and those years, but I do not think the job still has been done in the way Congress had in mind.

What happened to the money? The money was appropriated and it was parceled out among the existing research organizations of the Department. It disappeared—not exactly into limbo, but into the preestablished machinery of the Department of Agriculture—the research machinery I refer to. That is why I say I do not think you have made a truer statement anywhere than your statement here that the administrative organization of the Department will absorb this new fund, and this new job.

I think it is just a natural part of the business of carrying on government that when you get a big and efficient, well established, usually smooth-working organization such as the Department of Agriculture, it will absorb these new things.

The Department, in the field of research, has not only its own research agencies and organizations, which do actual test work and experimental work, but it does a great part of it, as Dr. Shaw has pointed out, through the land-grant colleges and experiment stations.

Every one of those agencies and bureaus and every scientist in those individual agencies, has projects that he has been wanting to get at for a long time, and has not been able to do so because of the lack of funds.

Doubtless they are worthwhile projects, and I am not questioning that at all, you understand that. But they are the same projects that they have had in the back of their minds or on their proposed budget for years.

Now, Mr. Secretary, if we have a new idea here, if this is something new, and something worth doing, there is a fear in my mind that precisely the same thing will happen to this bright new idea which, after all, embodies only a new way of looking at things, because as you point out in your statement, the Department now has the authority to do virtually everything recommended by the Commission, so all we have is a new way of looking at things—a new way of approaching a problem here.

I mean no disrespect at all to Dr. Shaw when I say that my belief is that if this new appropriation, the new approach, is turned over to him in his present capacity—and I am speaking of Dr. Shaw not personally but as the head of the existing agency—the same thing would happen that happended to the marketing act. I have every belief that if it were turned over to him as the head of a new and different agency in the Department, then the objectives of the bill would be carried out, but if you turn it over to him as the head of his existing research agency, neither he nor you can escape the dissipation of funds and objectives that will inevitably occur, as his organization quietly absorbs this new money and goes on with its long-cherished programs.

Mr. DIXON. Would the gentleman yield?

Mr. HEIMBURGER. Of course, Dr. Dixon.

Mr. DIXON. The President's Commission, I think, had that fully in mind, and they had those misgivings, just as you have, and as I have. That is why it recommended, even under the alternate program, an Advisory Board—it is more than an Advisory Board—set up by the Department of Agriculture, but with the same powers as a corporate directorate, and that Board would receive these funds and that Board would be responsible for seeing that the funds were expended exactly in the channels set out by the legislation.

I wonder if that would not partly or entirely remove your misgivings?

Mr. HEIMBURGER. That is exactly the opposite approach to simply enlarging the existing appropriations to present agencies of the Department, and I hope you gentlemen understand that there is nothing personal in this at all. I am discussing what appears to be just an inevitable part of this machinery of government that all of us get caught in.

I do not doubt, Mr. Peterson—you do not need to answer this—that you have discovered since you have been in your present position that there were some things you would like to do, or like to have done, that you have found somehow you simply cannot get done because of some kind of a wall of resistance. It is not stone, but it is a lot more than feather meal, and that keeps you from doing some of the things you want to do because of the established routine, the inertia of the procedures and policies and programs which have been so long established in the Department of Agriculture. Is that true?

Mr. PETERSON. Mr. Heimburger, obviously when an agency or an organization as big as government has become today gets launched out on a particular area of endeavor, it is unquestionably, as I think all of us in this room know, difficult to quickly and substantially modify the direction of its efforts. There is no question but what there are things that we would like to do that are difficult to do, and the only way they get done is by keeping constant pressure on to get them done. They do not get done quickly. Let us agree to that.

Secondly, no Secretary of Agriculture is entirely a free agent to do everything that he might want to do within his own Department.

So far as funds are concerned, the head of any department, including the head of the Department of Agriculture, does not have unlimited funds at his disposal to do all of the things that he would like to do.

The Department has many responsibilities under many, many pieces of legislation enacted by the Congress, and in any given fiscal year the Department has to exercise a judgment as to how it distributes whatever funds are available to it, and it does not have control over the bulk of its funds today because of the operation of legislation, particularly in the price support field and related activities, for example.

Therefore, the funds that are expended on research, on resource management, conservation, for example, as well as departmental administrative funds, find themselves being compressed between a budget ceiling and the automatic requirement for funds of legislation in the price support and related fields—the economic stabilization area of the Department's responsibility automatically absorbs certain volumes of funds in response to the operation of legislation which the Secretary is directed to carry out, so you do get the compression.

I think it is apparent that the original objectives of the Research and Marketing Act have not been met so far as financing is concerned, and it obviously follows that we have not gone as far as the original objectives contemplated in exploring that field nor as fully as the Congress intended, and the country had hoped, at the time the act became law by action of the Congress.

We have substantially increased those funds in the past few years. I note here in this table that Dr. Shaw has that the level of appropriation stayed almost constant for 6 years, beginning with the third one after the original appropriation.

There is another reason, I think, too, that funds have not gone into this area in the total research effort in agriculture, Federal and State. That is because the expression by producers themselves, particularly upon the land-grant colleges, and we feel the expression of producer groups here in the Department, as I am sure the committees of the Congress do also—include so many things that producers feel they need and want in the area of production research, to meet the immediate problems that they are dealing with every day. There has been a total pressure to keep funds in the category of what is generally termed production research.

Mr. HEIMBURGER. May I interrupt you?

Mr. PETERSON. Certainly.

Mr. HEIMBURGER. That, of course, was one of the very factors that the committee and Congress had in mind when they undertook to set up a separate agency for the administration of the market research program in the 1946 act, to have an agency which was not as immediately susceptible to those pressures as the old machinery that the Department had.

Mr. PETERSON. The point I was getting to, even if the Congress had done so, the total pressures for money in the total research field would have been such that I am not sure, in my own mind, if they would have accomplished substantially different results than have occurred. Those pressures exerted themselves before the Appropriations Committee for whatever funds were available. The Congress has to divide the funds among many activities for which they have to appropriate. There are many cases where the appropriations have not met authorized levels. I certainly recognize the point that you make, that it would be possible, and I think there is an ever-present danger, that what the Congress might do here in this area we are discussing, could get overshadowed in the total effort. That is not our intention. It is not the intention of the Congress. It is not the intention of the Commission. We fully recognize that danger and my discussion was pointed primarily to the administrative organization. I think you are all familiar with the problems created there.

I said that in our view many administrative problems would be created if an independent agency were to be created and we admit freely the point that you make. Again, I want to say that I am not sure, in my own mind, that any different results would have occurred financially had the Congress pursued a different course of action at that time. That, I recognize, is a matter of judgment and subject to debate.

Mr. HEIMBURGER. I am now talking about end results of research and I am not sure that it would. Maybe more money would not have done any good. I know that you are not familiar with some of the past history of this matter, but let me say, Mr. Peterson, that the situation was so bad, as far as the apparent dissipation of marketing research funds into the overall research program is concerned, that a few years ago when the Agriculture Appropriation Act was under consideration in the committee, I know of my own knowledge that some of those men who were most interested in promoting the objectives of the Research and Marketing Act—I will name two of them, Mr. Hope and Mr. Horan—met and discussed seriously whether or not they should oppose any appropriation of funds for the Marketing Act of 1946 until changes had been made in the manner in which the funds were being used. They seriously considered such action in 2 separate years. In both cases they came to the conclusion that, "Well, maybe things will improve. Let us try it another year."

Let me ask just one thing before I ask you this question: Dr. Shaw, let me refer to the question Mr. Hagen asked you about the man who had an idea for doing something with the cotton stalks. One of the basic ideas of the Research and Marketing Act of 1946 was that there should be set up in the Department of Agriculture machinery for research. That was not necessarily for laboratories, but the machinery for getting research done. Machinery, that is, which would be available to everyone, to anyone with an idea, and the philosophy of that was this: That General Foods, General Mills, Borden Milk Co. and the big organizations who spend substantial amounts for research—they have excellent research facilities—but Joe Miller, who runs a grocery store down here in southeast someplace has no research department and he has no funds to spend for research, yet it is not beyond the realm of possibility that Joe Miller may once in a while have an idea for improving the marketing system which has some

merit. One of the things they wanted to do was to set jup in the Department a completely uncommitted, unprejudiced research organization which would be receptive to such ideas from just ordinary individuals, from just anybody who thought he had something to contribute, and would then take whatever action that idea seemed to be worth and carry out the research necessary to find out whether it had possibilities.

REVIEW OF PROPOSALS FOR RESEARCH

I would like to ask Dr. Shaw this question: Can you name now any instances where an individual completely outside the framework of the organization of either the Department of Agriculture or the land-grant colleges or the advisory committees, has come to the Department with a suggestion which has been followed up with research?

Mr. SHAW. We had authority in that act, as you know, to contract for research with both public and private institutions and with individuals. I am not sure that I can name, or that there exists a case, where an independent individual has made a presentation to the Department to finance a research project by contract. However, I can say this to you: We have entertained all proposals that have come, from wherever they might have come, and with our advisory committees, which as you know usually consist of 11 members outside of Government, we have reviewed all of these proposals and have placed priorities on them. If anyone had an idea that was superior and seemed to indicate that it would give benefits to agriculture, we would contract for it with him.

Mr. HEIMBURGER. I am not speaking about anyone coming in and looking for contracts particularly, but just a man with an idea.

Of course, you know how your advisory committees work. They meet at infrequent intervals and they have laid before them an agenda for their consideration prepared by an employee of the Department. I do not mean to imply any adverse motive on the part of these people, but the people who have made up this agenda and who have winnowed this suggestion or these suggestions are the very people who have their own projects that they sincerely believe in—that they want to get money for. Are they going to recommend that some of the money available be applied to the harebrained scheme that Willie Jones came in with?

Mr. SHAW. Not if it is harebrained.

Mr. HEIMBURGER. It may seem harebrained to them. If there are any instances where the Department has carried out research on such a basis, at the suggestion of an individual completely unconnected with any of the Department machinery, I would like very much to see them.

Mr. Chairman, may I make the request that he provide us with a list of such instances, names, dates, and types of projects?

As far as I am concerned, if you can get a list up to 10, you can stop. I want to find out if there are any.

Mr. SHAW. I do not know if there are, but I would only like to make this comment in regard to it: Where a private individual has a patent on a project, we could not——

Mr. HEIMBURGER. I am not speaking of that. I am speaking of an idea which a grocery man, a processor, or anyone else might have that seems to have merit. He comes to the Department and says,

"This idea seems to me to have merit. I have not tried experiment No. 1, since I have nothing to experiment with. How about you taking it and see if it is worth anything?"

Mr. SHAW. I did not understand you before.

There are thousands of instances in the category that you just mentioned where a farmer or a man from industry comes to us and says, "Here is a problem that I am confronted with. Here is a lead that I think is worth while following up and would you take it and do it?"

There are thousands of instances like that.

Mr. HEIMBURGER. That is the kind of instance that I wanted to get.

Mr. SHAW. What I thought you meant was where the private individual came in with an idea and wanted us to contract with him and he would do the work.

Mr. HEIMBURGER. No; I did not have that in mind.

Mr. SHAW. The other way around?

Mr. HEIMBURGER. Would you give us a few assorted instances of this type that you mentioned?

Mr. SHAW. Yes.

(The data above referred to are as follows:)

The following examples from just one of our many laboratories and field stations are typical of the thousands of requests we get to do work on problems affecting farmers and industry.

TYPICAL EXAMPLES OF REQUESTS FOR RESEARCH TO THE PEORIA, ILL., UTILIZATION RESEARCH LABORATORY THAT RESULTED IN RESEARCH BEING INITIATED

Effect of artificial drying of corn on wet milling.—The technical advisory committee of the Corn Industries Research Foundation asked the Northern Utilization Research and Development Division to undertake studies which would determine the maximum temperature of safe drying of corn for wet-milling purposes and to devise methods whereby heat-damaged corn could be detected.

Removal of rodent contamination from corn.—More stringent standards set by the Food and Drug Administration for grain going into food uses raised a problem of better methods for removing rodent contamination from corn. Work on this problem was undertaken upon recommendation of the American Corn Millers Federation, which is made up of the major corn dry-milling companies.

Soybean glue for shotgun shell casings.—Studies on the use of soybean protein for the preparation of glue suitable for the manufacture of shotgun shell casings were suggested by the Western Cartridge Co. and resulted in development of a glue for this commercial use.

Use of soy flour in baked goods.—Studies on the methods for using soy flour in baked goods were recommended by the technical committee of the Soya Food Research Council and led to improved methods and processes now in use.

Flavor stability of soybean oil.—Investigations on improving the flavor stability of soybean oil were recommended by the Soybean Research Council of the National Soybean Processors Association and led to our development of methods for such improvement.

Wheat conditioning.—Possibilities for improving the baking quality of flour and for effecting economies in milling operations by modified wheat-conditioning procedures led the Association of Operative Millers to recommend a program of research in this area.

Wet-milling process for wheat flour.—At the suggestion of the DCA Industries, Inc., New York, N. Y., work was initiated under a memorandum of understanding to produce evaluation quantities of a "wheat flour solubles fraction," resulting from the wet milling of wheat flour by the NURDD batter process for the production of wheat starch and wheat gluten. Development of valuable uses for the solubles fraction would make the use of wheat flour more attractive economically and promote the industrial use of wheat.

Development of sodium gluconate industry.—At the request of the Diversey Corp., NURDD cooperated in the development of an economic process for the manufacture of sodium gluconate, production now amounting to 3 to 4 million pounds annually.

Gelsoy, a food adjunct from soy flour.—Pilot-plant studies on the alcohol washing and aqueous extraction of soybean flakes were suggested by Allied Mills as a result of our laboratory studies on these processes.

Use of soybean oil derivatives in protective coatings.—At the suggestion of Archer-Daniels-Midland Co., we are now cooperating with them on the evaluation of certain of our new oil derivatives (vinyl ethers of fatty alcohols) as basic ingredients of protective coatings.

Alpha-cellulose pulp from sugarcane bagasse.—A demonstration of the USDA process for converting sugarcane bagasse to a dissolving pulp suitable for rayon manufacture was requested by the Von Kohorn International Corp., New York, N. Y.

Mr. PETERSON. With respect to the general comment, Mr. Heimburger, I think it goes to the point mentioned earlier. One of the determinations, it seems to me, that needs to be made, is whether or not we are going to put agriculture on a competitive basis, in research, with the rest of the economy. I think this is the heart of the thing you are talking about.

Mr. HEIMBURGER. I agree with you 100 percent, Mr. Peterson.

This gets me around to my question. When Mr. Peterson comes up again, or prior to the time he appears before the committee again on this subject, would you consult with some of the people in the Department who have been most familiar with the operation of the Research and Marketing Act and consult with your own heart and good judgment on this thing and either reaffirm this position which you have taken here or give us another judgment on it?

Mr. PETERSON. We will certainly give the committee, Mr. Heimburger, the very best judgment that we have on all of the facts that we can develop, not only on this but any other subject.

Mr. HEIMBURGER. I did not mean that you would not. I am sure that you will. Would it be possible for you to separate yourself from your official position to the extent of giving us simply your opinion as an informed observer of this particular matter?

Mr. PETERSON. As to whether or not I can separate myself from my official responsibilities, I expect that it would be a matter that you can judge better than I can, Mr. Heimburger. I will certainly give you the best judgment I possess, anytime the committee may wish to have it.

Mr. HEIMBURGER. I am sure you will.

Mr. SHAW. Could I make one comment with relation to Mr. Heimburger's remarks?

Mr. ABERNETHY. Yes.

Mr. SHAW. We currently do have in the Department an Agricultural Marketing Service which is set up in the framework—I believe pretty close—to what was originally recommended in the first draft.

Mr. HEIMBURGER. I think it is, too, Dr. Shaw. I think substantial progress has been made the last couple of years in doing that.

Mr. SHAW. In terms of increasing appropriations to the marketing field, since the time that that agency has been set up, the single limitation on our requests for funds for increases has been the availability of personnel. We have desired to expand the marketing work faster than it has been done.

Mr. HEIMBURGER. You mean that your requests come up from the various sections of your Agency and they have not been curtailed at the higher level?

Mr. SHAW. I say that, in the case of marketing that in dealing with Mr. Wells and others in the Agricultural Marketing Service, the single fact that has set the limit on what we have asked for has been what Mr. Wells figured he could spend in terms of the availability of people. It would have been higher had he figured we could have done more.

Mr. PETERSON. There is an associated problem there, as I understand from personal conversations that I have had with Mr. Wells, Dr. Shaw, and that is the adequacy of physical facilities in which to conduct some of the work. That has been under study in the Department for some time.

Mr. HEIMBURGER. Does that relate to contract work also?

Mr. PETERSON. I am not sure as to contract work; but, as to direct work, as I understand Mr. Wells' position, he feels that we need, and he agrees that we need, additional physical facilities to do direct research work.

Mr. SHAW. He does quite a bit of contract work, too.

The other point I wanted to make is that currently we do have in the Agricultural Research Service this work related to new uses of farm products in four divisions headed up by Dr. Irving, Deputy Administrator. That is a separate segment from the other work, and I do not know of any suggestion made by the Commission that we should do a different type of work than that being done by our four regional laboratories. They said that we should do more of the same.

If Congress does decide to implement that program and says that there should be expanded funds for the utilization research, it would go to those units doing utilization research and not to anyone else.

Mr. HEIMBURGER. Probably used on the same general type of projects that they now have underway?

Mr. SHAW. The proposals that the Commission has in its report are expansions of the work that we have underway.

Mr. HEIMBURGER. You said some time back that if we have a new idea here it should be treated this way. Of course, you understand, gentlemen, that what I have said here is not criticism of any individual and I mean that sincerely. I think you gentlemen are doing a wonderful job and it was a commentary on the processes of Government rather than criticism of anyone or anything.

Mr. PETERSON. We take it in that light.

Mr. HEIMBURGER. There we run into the budget problem, the time lapse between the time when a project must be conceived and a budget drawn up for it at the operating level and the time when you get the money for it. If this money were available today, it would still be 2 or 3 years before those budgets could be set up at the operating level and move right on up through and have a final budget, would it not?

Mr. SHAW. It takes time, there is no question about that, but we have plenty of plans to implement at the present time.

Mr. HEIMBURGER. I mean the time lag on a specific project is such that when it is conceived and set up at the operating level until the Appropriations Committee has passed on it and you have the money for it, that is rather substantial and it is one of the things that delays and slows down the adoption of any new ideas and programs in the Department?

Mr. SHAW. That is correct.

Mr. HEIMBURGER. That is all, Mr. Chairman.

Mr. ABERNETHY. Gentlemen, may I express to you my personal appreciation and that of the entire committee for your presence here this morning. We have been delighted to have had you and hope to have you back again soon.

Mr. PETERSON. Thank you, Mr. Chairman.

Mr. ABERNETHY. We will adjourn at this time.

(Thereupon, the committee adjourned at 12:40 p. m.)

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